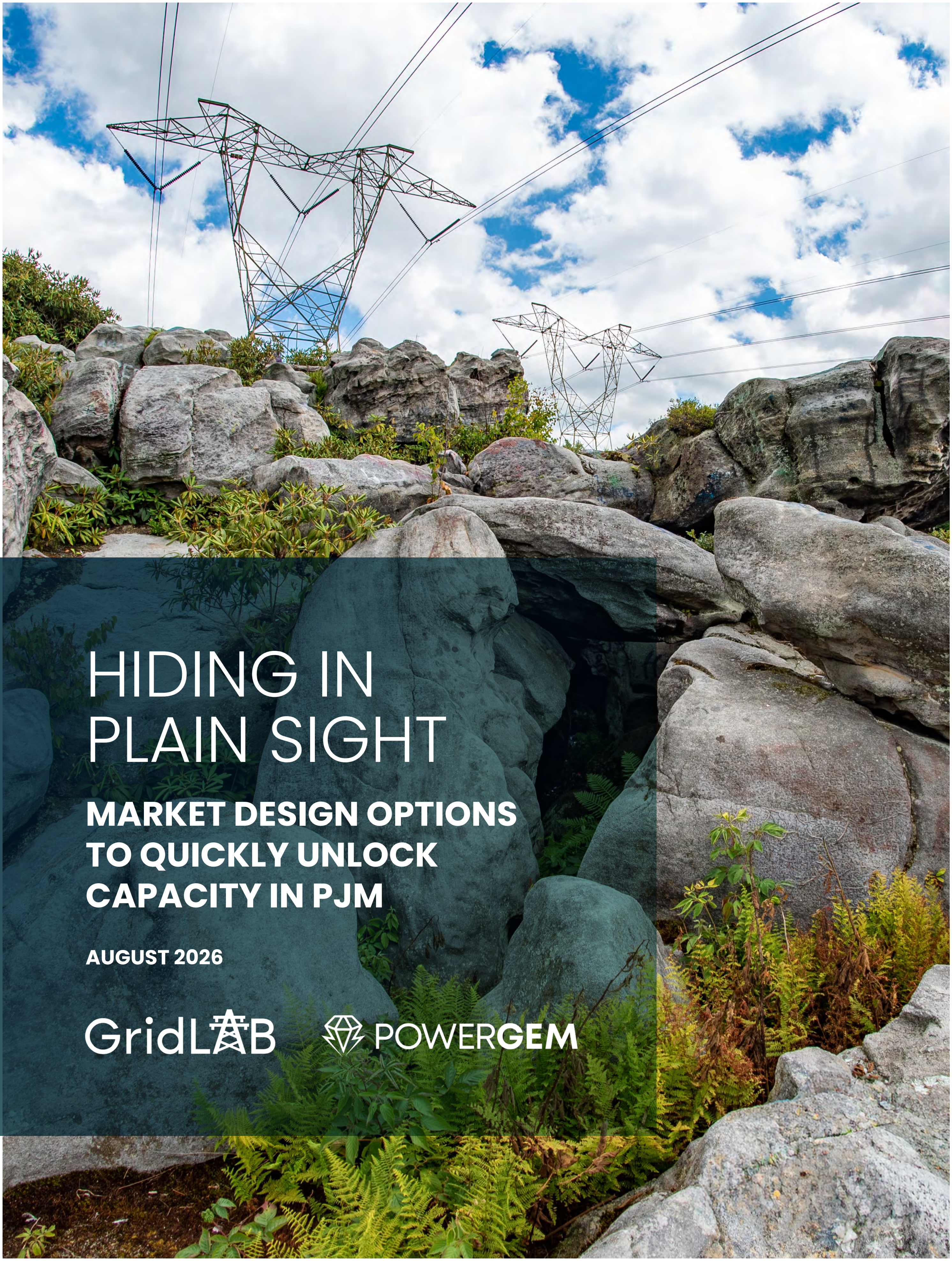

HIDING IN PLAIN SIGHT

MARKET DESIGN OPTIONS TO QUICKLY UNLOCK CAPACITY IN PJM

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Summary

PJM faces severe capacity shortages, high capacity market clearing prices with capacity charges of $16 Billion driven by unforeseen load growth from data centers, constrained new supply from supply chain disruption and slow interconnection, delayed capacity auctions, and lower capacity accreditation values. This paper proposes the following solutions to address PJM's capacity challenges:

1. **Speed up resource Interconnection**: Reform Energy Resource Interconnection Service (ERIS) as a provisional pathway with limited study needs and upgrades required, enabling projects to connect as energy-only resources while full deliverability studies proceed.
2. **Target investment to improve the winter performance of gas resources**: Encourage winterization and firm fuel investments by prospectively recognizing verified performance improvements in accreditation models.
3. **Recognize energy contributions from ERIS resources and deliverability caps in accreditation**: Incorporate the energy contributions of ERIS resources and remove deliverability caps of NRIS resources in resource adequacy models that set the capacity auctions capacity requirement and resource capacity credits.
4. **Update non-firm interregional assistance modeling**: Replace administrative ceilings on emergency help from neighboring grids with probabilistically determined values.
5. **Accredit large load and data center flexibility**: Offer data centers a menu of flexible options, including partial curtailment limits, and credit their contributions proportionally instead of enforcing an all-or-nothing requirement.

Doing so would help unlock over 11 GW of near-term capacity, which is sufficient to close the recent auction capacity deficit. These measures are reversible, work within the existing market framework, and can be implemented in parallel to PJM's own proposals. They do not substitute for harder questions. PJM and its states should continue serious evaluation of alternative market constructs and ways to interconnect resources faster. The reforms proposed here can reduce consumer exposure to high prices and buy critical time for longer-term market-design and governance changes.

INTRODUCTION

What Is Happening and Why It Matters

PJM's most recent Base Residual Auction (BRA) cleared at the $325/MW-day RTO-wide cap. It was the third consecutive auction to produce roughly $16 billion in capacity charges, and the current trajectory suggests the next one will look similar without significant changes to market design. PJM's analysis indicates that, without the administrative cap, ratepayers would have faced an even larger bill, as the 2028/29 BRA auction would have cleared closer to $555/MW-day, increasing total costs to over $30 billion.

The high clearing price matters for two reasons. The first is affordability, and the political response it has triggered, prompting PJM's governors to organize collectively and states including Illinois, New Jersey, and Maryland to reassess the value of RTO participation.

The second is that despite these high prices, there has been markedly little new capacity brought online in recent years. In the last auction, for example, only 525 MWUCAP of new capacity was offered into the market (Figure 1), despite clearing capacity 6,800 MW below the RTO Reliability Requirement.[1]

In other words, new capacity clearing the auction has been declining at the same time prices are increasing and capacity shortfalls are occurring, and less than 0.4% of the total $16.4 billion in capacity payments is directed to new resources and uprates (Figure 2).

FIGURE 1.

Cleared Capacity (UCAP) by New Generation / Updates by Delivery Year

Source: PJM, 2026

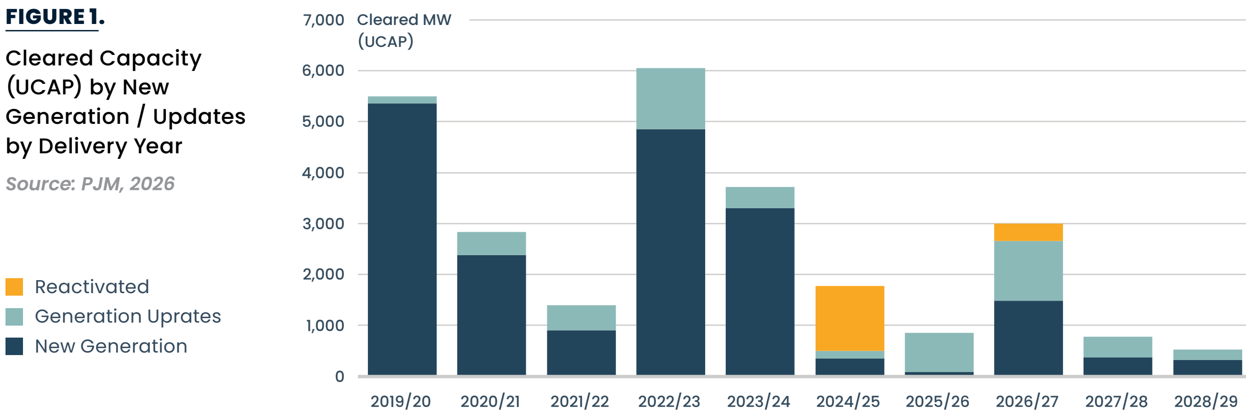
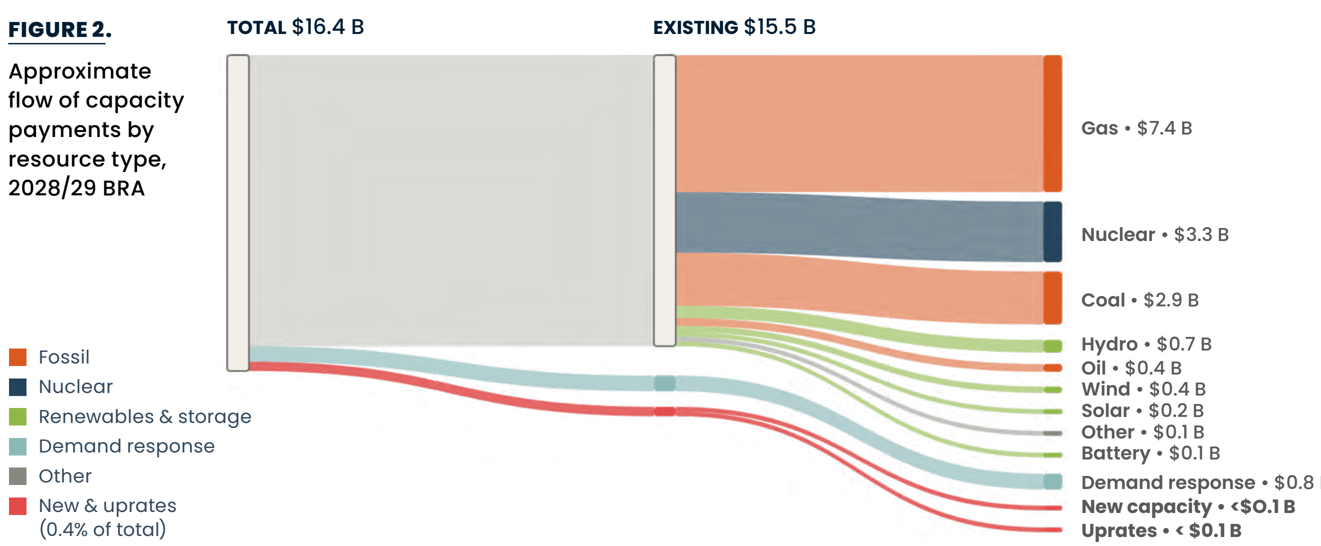


FIGURE 2.

Approximate flow of capacity payments by resource type, 2028/29 BRA



1 PJM. 2026. *2028/2029 Base Residual Auction Report*. https://www.pjm.com/-/media/DotCom/markets-ops/rpm/rpm-auction-info/2028-2029/2028-2029-bra-results-report.pdf

Much of the high prices is due to new load growth. According to the Independent Market Monitor, data center load accounts for roughly 40 percent of the $16.4 billion in capacity charges from the most recent auction.[2] Load growth arrived faster than the supply chain and the interconnection queue could respond. However, new load is not the only reason for the tight capacity supply. A set of resource adequacy and accreditation changes, which PJM instituted to follow emerging best practice, tightened the accounting at precisely the moment load surged. Because some of the capacity deficit reflects modeling and policy choices, rather than physical scarcity, there are ways to improve resource adequacy and lower the capacity deficit in the near term, prior to longer term market reform and in parallel with governance changes.

Building on the pathways outlined in PJM's Powering Reliability Through Market Design report,[3] this paper proposes two near-term interventions to resolve the immediate capacity crunch within today's market construct:

Fast-track new entry: Reform energy-only interconnection as a faster, more streamlined, provisional bridge while full deliverability studies proceed.

Recognize and improve the capacity already on the system: Adjust accreditation methods and resource adequacy models to incent improved resource performance, and properly account for latent, uncredited capacity, and provide a wider set of options for large load flexibility.

We estimate these reforms can unlock over 11 GW of capacity before a single new project completes full interconnection. These mitigations can buy critical time for stakeholders to tackle longer, more substantive, and harder questions related to long-term market design, market structure, or governance changes.

This paper first describes the market conditions that produced the current price levels, then discusses potential near-term solutions by directly pairing each diagnosis with its corresponding market design change.

2 Howland, E. 2026. "Data Centers Were 40% of PJM Capacity Costs in Last Auction: Market Monitor." Utility Dive, January 7, 2026. https://www.utilitydive.com/news/data-centers-pjm-capacity-auction/808951/

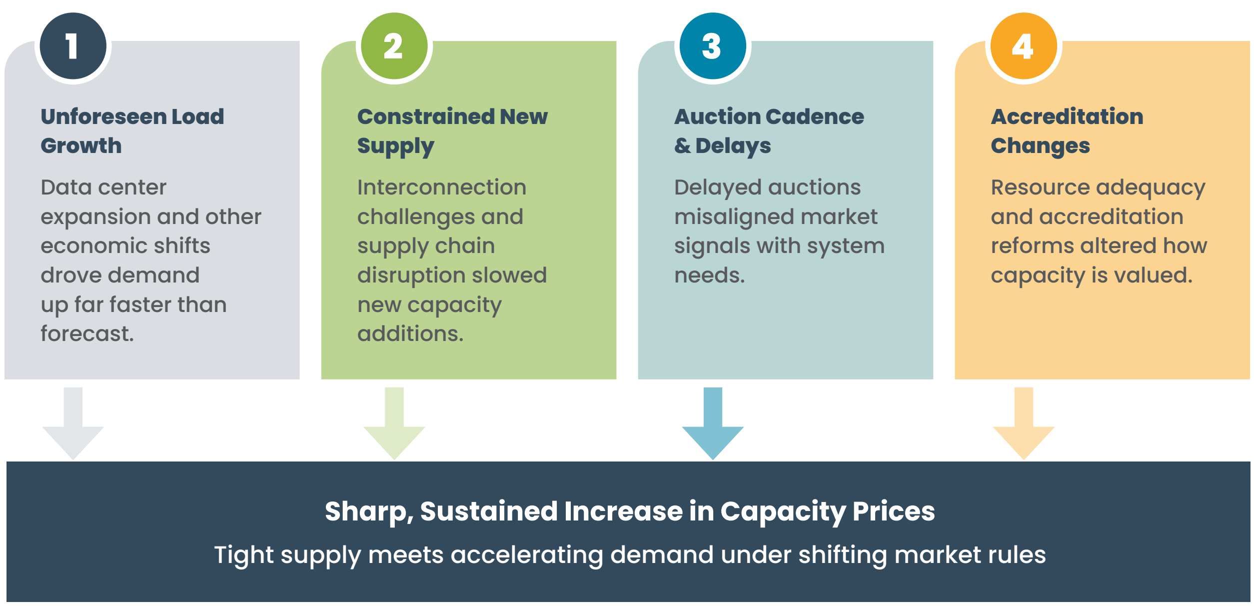
3 PJM. 2026. *Powering Reliability THrough Market Design, Addressing Rising Demand and Constrained Supply, and Stimulating Investment To Support Durable Reliability.* https://insidelines.pjm.com/pjm-to-lead-market-reform-effort-to-support-generation-investment-and-reliability/

UNDERLYING ROOT CAUSES:
It's not just load growth

The conditions producing today's capacity prices are best understood not as a single issue of large load growth, but as four developments. These drivers arrived together, in a compressed window, and compounded one another. The first driver originated from outside the electricity sector entirely, while the remaining three stem from the supply side: the procedure of interconnecting new capacity, the cadence of the capacity auctions themselves, and the way capacity is counted (Figure 3). Some of these pressures were beyond PJM's control, while others were deliberate and well-reasoned choices whose timing, in retrospect, proved unfortunate.

1. Rapid, unforeseen load growth driven by external economic shifts such as data center expansion.
2. Interconnection challenges and supply chain disruption that slowed new supply.
3. Capacity auction cadence and delays that misaligned market signals.
4. Accreditation and resource adequacy changes that altered how capacity is valued.

FIGURE 3. Four drivers of increased capacity prices in PJM



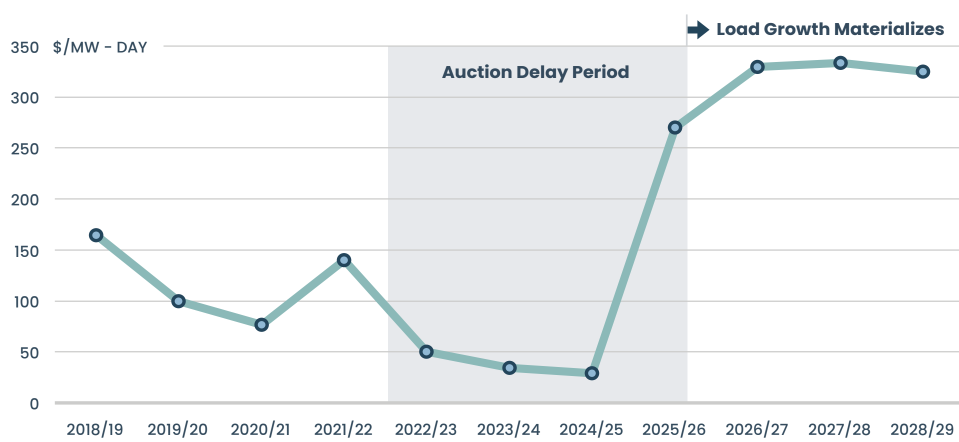
Data center demand arrived faster than any forecast anticipated. It is tempting to look at neighboring ISOs that have not experienced comparable capacity shortages or price volatility and conclude that PJM handled something poorly. However, PJM, and Northern Virginia in particular, was simply the first. The data center wave arrived there first and at greater scale, which meant PJM confronted a forecasting and planning problem the rest of the industry had a somewhat longer lead time to prepare for.

Even had that demand been perfectly anticipated, supply could not have responded quickly enough. PJM's reformed interconnection process opened its first cycle with more than 800 projects totaling 220 GW of proposed capacity, and while the 2022 reforms have materially reduced study times, the historical record on delivery remains poor. The timeline from interconnection application to commercial operation in PJM rose from an average of under two years in 2008 to more than eight years by 2025. More telling is what happens after the studies are complete: since 2020, PJM has executed interconnection agreements for 103 GW of generation, of which only 23 GW has reached commercial service. Faster studies are necessary but no longer sufficient, because projects are now stalling even after they clear the queue due to permitting, siting, equipment lead times (particularly for transformers and turbines) and financing obstacles.

Neither load growth nor supply constraints fully explain where the market ended up. The capacity market's own cycle played a role. Following FERC's determination that PJM's capacity market rules were unjust and unreasonable in their treatment of state-subsidized resources,[4] the BRA for the 2022/2023 delivery year (originally scheduled for May 2019) was postponed until May 2021 while FERC considered the Minimum Offer Price Rule. The last auction held on the normal annual schedule was the 2021/2022 BRA in May 2018, leaving a three-year interval in which no capacity was procured on a forward basis. PJM then compressed the calendar, holding auctions at roughly six-month intervals in order to return to a three-year-forward cadence.

FIGURE 4.

PJM BRA auction results by delivery year, with auction delays highlighted



4 PJM. 2021. *PJM Capacity Auction for 2022/2023 Delivery Year Opens.* https://insidelines.pjm.com/pjm-capacity-auction-for-2022-2023-delivery-year-opens/

The consequence was a market that lost its forward visibility precisely when it was most needed due to a step change in load growth. The 2025/2026 auction, the first to produce a large price increase, was held in the summer of 2024, less than a year before the delivery year began. A capacity market's central function is to signal future scarcity early enough for supply to respond. When auctions are separated by six months, there is no meaningful interval in which a developer can observe a price, make an investment decision, and develop a resource. In short, demand increased prices, but the market had no opportunity to reach a new equilibrium. The result is a price that is high, but not durable: high enough to burden consumers, but too volatile and short-term to support 20- or 30-year infrastructure investments.

The fourth driver is the least discussed and, as we will argue, the most consequential for near-term action. Over the same period, PJM revised how it counts capacity. It began modeling weather-dependent, correlated outages of the thermal fleet in its resource adequacy studies, and it moved toward marginal ELCC accreditation across all resource classes. While both changes were sound in substance and consistent with emerging best practice, bringing PJM's methods closer to how resource adequacy risk actually manifests, they took effect at the same time the load started growing. The result was a market tightening from both directions at once: the capacity requirement rose while the accredited value of the existing fleet fell. We return to this in detail in the second half of the paper, because the way capacity is counted turns out to be where the most actionable near-term opportunity lies.

The industry at large was caught off guard by the speed of this transition. This paper offers a diagnosis of how these forces interacted, not as an indictment of any decision PJM made along the way. Reviewing these intersecting drivers serves two core purposes: to demonstrate that the blame does not fall squarely on large load growth, and to explain that market design and policy choices, including auction delays, interconnection queue processes, and accreditation methods, are part of the problem and can also be part of the solution.

Proposed Solutions and Market Design Considerations

First | Speed up Resource Interconnection

The long-term solution to a genuine capacity shortage is more supply. PJM's binding constraint is neither developer interest nor the number of proposed projects. The queue holds far more capacity than the system needs. The true bottleneck is the speed at which those projects reach commercial operation.

To participate in the capacity market, a new resource must obtain a firm interconnection service, or Network Resource Interconnection Service (NRIS). This requires PJM to study each generator and determine whether its output is "deliverable" to load under stressed system conditions, and whether it would be curtailed or cause curtailment of other NRIS resources. Meeting that standard frequently triggers network upgrades, and the cost and time associated with those upgrades are assigned to the interconnecting generator. The alternative, Energy Resource Interconnection Service (ERIS), was conceived in FERC Order No. 2003 as the non-firm counterpart: faster and cheaper to study, but without guaranteed deliverability, with higher curtailment risk, and without eligibility to earn capacity revenue.

In principle, this two-tier structure gives developers a real choice. In practice, it no longer functions as intended. A recent empirical analysis of more than 36,000 interconnection requests and 4,500 cost studies spanning two decades finds that ERIS delivers interconnection that is neither cheaper nor faster.[5] As the grid has become more constrained, the share of ERIS studies assigned zero network upgrade cost collapsed from roughly 80 percent in the mid-2000s to about ten percent by 2022, eliminating the financial rationale for choosing energy-only service. The timing advantage has eroded on a similar path, with ERIS and NRIS resources reaching an interconnection agreement at essentially the same time. Developers have responded rationally and in PJM, NRIS now accounts for 92 percent of executed interconnection agreements.[6]

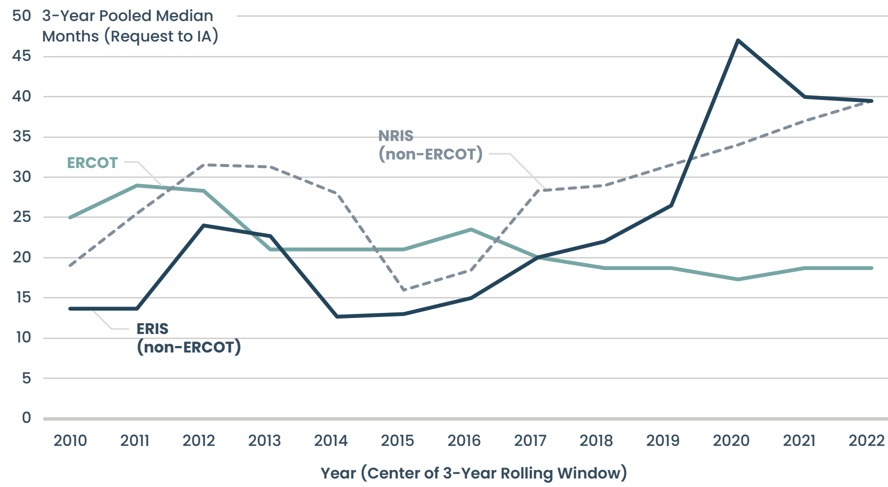
5 Norris, et al. 2026. *Is Energy-Only Interconnection Working? Empirical Evidence from Two Decades of US Market Data.* Available at SSRN: https://ssrn.com/abstract=6881698 or http://dx.doi.org/10.2139/ssrn.6881698

6 Rand, et al. 2026. *Queued Up: 2026 Edition, Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2025.* Berkeley, CA: Lawrence Berkeley National Laboratory. https://emp.lbl.gov/publications/queued-2026-edition-characteristics

FIGURE 5.

Historical evolution of interconnection study durations (2010-2022).

Source: Norris, et al., 2026



The important conclusion is not that energy-only interconnection is a flawed concept. It is that ERIS, as currently studied, has stopped functioning as a genuine non-firm product. The cause is study methodology as transmission providers frequently require ERIS projects to fund network upgrades to resolve constraints that could be managed in real time through security-constrained economic dispatch.[7]

Requiring full deliverability is a policy choice, not a physical necessity.

While defensible in certain contexts, this practice, in PJM today, imposes substantial costs and delays on a system that experiences very little curtailment, with wind resources curtailed below 2% of available energy, less than half the national average.[8]

A further mismatch worth discussing, because it connects this section directly to the accreditation discussion that follows. Deliverability studies evaluate the system under summer peak, winter peak, and shoulder light-load conditions, on the premise that these are the moments when the transmission system is most constrained. But PJM's resource adequacy risk is not principally a function of demand level. In the winter storms that drive most of PJM's loss-of-load expectation (and therefore most of the capacity requirement) shortfalls occur because a large share of the fleet is unavailable, driven substantially by weather-dependent outages of gas resources. Those correlated outages are not reflected in deliverability studies. The result is a set of study assumptions that constrain transmission access based on conditions that differ materially from the conditions actually driving reliability risk.

Connect and Manage in ERCOT

ERCOT's "connect and manage" framework offers a useful counterfactual. Projects there reach commercial operation in a median of 47 months, roughly two years faster than ERIS

7 Norris, et al. 2026.

8 Wiser, et al. 2025. *Land-Based Wind Energy Technology Update: 2025 Edition*. Berkeley, CA: Lawrence Berkeley National Laboratory. https://emp.lbl.gov/wind-technologies-market-report.

projects in FERC-jurisdictional regions, and ERCOT has held processing durations stable while timelines elsewhere have more than doubled since 2009.[9] That speed has allowed ERCOT to add generation at a pace no other region has matched, and to serve a record 90+ GW peak with muted energy prices and no capacity market.

The differences matter and should be acknowledged. ERCOT is energy-only, operates outside FERC jurisdiction, has no formal resource adequacy construct, and carries no comparable interregional obligations. This paper borrows the interconnection mechanism, acknowledging that the market model does not apply. What makes the borrowing attractive is that it is a no-regrets reform: faster interconnection is valuable under the current RPM and becomes more valuable still under a potential energy-based construct considered by PJM and other stakeholders.

Interconnection reform directions

The most direct near-term change is to make ERIS function as it was intended: a genuine fast-track path. Projects should be able to energize as energy-only resources following a limited study, with upgrades required only for safe interconnection, while the fuller NRIS deliverability study proceeds in parallel. This is not a novel construct — CAISO, ISO-NE, and NYISO already use variants of a "minimum interconnection" approach that manages thermal constraints through operational redispatch rather than up-front capital,[10] and CAISO maintains a formal separate ERIS study track in which only the point of interconnection and immediate network are analyzed.[11] A provisional pathway of this kind gets megawatts producing energy years earlier, which improves reliability and reduces the likelihood that large loads face curtailment, without granting capacity credit that a project has not earned.

Several complementary fast tracks are available and underused. Surplus interconnection service, which sizes a new resource to unused interconnection rights at an existing site, can be studied in as little as 180 days and should avoid network upgrades entirely. Generator replacement at retiring plant sites operates on similar logic and was recently approved in PJM.

Second | Unlock the Capacity Hiding in Plain Sight

While the previous section recommended faster interconnection of resources as the longer-term answer to PJM's capacity challenges, it is not a fast one. Even under the reforms described above, a project energizing as an energy-only resource still needs to be built. A nearer-term opportunity is in capacity already connected to the PJM system, already operating, and already contributing to reliability, but which the capacity market does not fully credit, or its availability is lower than it otherwise could be.The authors draw a distinction throughout this section that

9 Rand et al. 2026.

10 Ibid.

11 Paterson, A., Siegner, K., & Coequyt, J. 2026. *The Interconnection Queue Continues to Be a Barrier to US Economic Competitiveness Here's how to improve it.* https://rmi.org/resources/interconnection-reform-ai-data-centers-generator-queues/

they consider important for how PJM should prioritize. Some of the proposed measures would genuinely improve physical reliability, by making resources perform better when the system is stressed. Others would correct accounting, by recognizing contributions that resources already make but that current methods understate. Both are legitimate, and both reduce the capacity deficit. However, they are different kinds of action, and conflating them invites the fair objection that the proposals simply redefine the problem away. This paper is not proposing that. Before turning to the individual levers, it is worth describing how the accounting tightened in the first place.

Accounting changes for IRM and ELCC

While load growth and data center demand have absorbed nearly all of the attention paid to recent auction results, and for understandable reasons, a second cause is related to the accounting mechanisms underlying the capacity auction: the installed reserve margin (IRM) requirement and the accreditation (ELCC) of resources. Over the same period in which load began to climb steeply, PJM revised how it counted capacity, compounding the capacity market challenge.

The first change was the introduction of weather-dependent and correlated thermal outage modeling into PJM's resource adequacy and ELCC studies. This was largely a response to Winter Storm Elliott, which demonstrated that a substantial share of the thermal fleet could become unavailable simultaneously under extreme cold, and to the broader industry reckoning that followed Uri. Modeling those correlated outages sharply reduced the accredited value of the existing thermal fleet.

The second change was a move toward marginal ELCC accreditation across all resource classes, replacing the prior approach of Unforced Capacity (UCAP) for thermal resources and class-average treatment elsewhere. Applied together, these changes materially altered what the same physical fleet was worth in the capacity market.

The effect on gas resources illustrates the mechanism. A gas turbine accredited at a UCAP value of approximately 95%[12] in 2021 (for the 2024/2025 auction) saw its accreditation fall to 67% in the 2028/2029 BRA once ELCC methods were applied and weather-dependent outage rates were incorporated. Applied across the fleet, these changes amounted to a reduction in accredited capacity of approximately 15,300 MW. While the total capacity requirement also dropped, there is now a large amount of potential capacity available from winterization and improved winter performance.

The secondary effects matter as much as the direct ones. Because the newly modeled outages are concentrated in extreme cold, the change shifted modeled resource adequacy risk from summer toward winter. Today, roughly 60% of loss-of-load expectation and 90% of expected

12 Based on UCAP = (1 - EFORd) accreditation and an average EFORd assumption of 5%

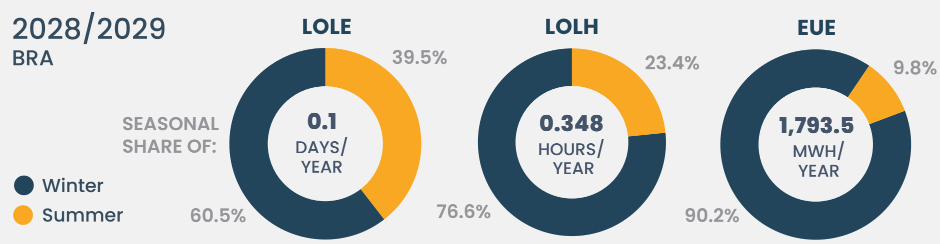
unserved energy (the metric now used for resource accreditation) occurs in the winter season (Figure 6). That seasonal reallocation of risk propagated downstream to every other resource class. Solar and storage, whose contributions are strongest in summer afternoons and evenings, saw their accreditation fall as a consequence of a change made to how gas resources were modeled. Solar and storage represent over 40% of the proposed capacity in PJM's Cycle 1 interconnection queue and are the resources most likely to be built in the near term due to gas supply chain constraints. The reduction in accredited gas capacity therefore also reduced the accredited value of the resources best positioned to close the resulting capacity gap.

The net result was a capacity market moving in both directions at once. The requirement rose, driven predominantly by large load additions. Accredited supply from the existing fleet fell, driven by methodology. The supply-demand balance tightened from both sides simultaneously, and the auction outcomes reflect the combination rather than either factor alone.

FIGURE 6.

Share of loss of loss expectation and expected unserved energy by season.

Source: PJM



The justification for these changes was sound, but the timing was unfortunate

Nothing in the preceding discussion should be read as an argument that PJM was wrong to implement these new methodologies. PJM made these changes following best-practice recommendations of resource adequacy practitioners, including the authors.[13] Correlated, weather-dependent outages are a real phenomenon, they are the principal driver of resource adequacy risk in winter-peaking and dual-peaking systems, and a resource adequacy model that ignores them systematically overstates how much firm capacity a thermal fleet provides. Marginal ELCC accreditation is likewise a more defensible framework as it prices the resource adequacy contribution of the next increments of resource additions or retirements.

The problem is not in the new methods, but rather the timing and compounding. Introduced within a narrow window, and coinciding with the steepest load growth PJM has ever forecast, this amplified the resulting price signal well beyond what the underlying physical shortage would have produced on its own. The market may have been able to absorb a demand shock or a methodology revision, but including both at once is considerably harder.

13 Energy Systems Integration Group. 2023. *Ensuring Efficient Reliability: New Design Principles for Capacity Accreditation.* Reston, VA. ttps://www.esig.energy/reports-briefs/new-design-principles-for-capacity-accreditation/

To the extent that the tightening reflects modeling and policy choices rather than physical scarcity, a portion of the apparent shortage is recoverable and can be achieved faster than new resource additions.

We want to be equally clear about what we are not proposing. This paper does not argue for adjusting accounting rules until the problem disappears, as that would trade a real reliability risk for a more palatable capacity price. Instead, this paper proposes a combination of four elements:

1. Targeted investment to improve the winter performance of resources, paired with accreditation that recognizes those improvements *(improves reliability)*,
2. Recognizing the energy contributions of energy only resources and resources limited by capacity interconnection rights (CIRs) *(improves accounting)*,
3. Better measurement and crediting of the reliability benefits that transmission and interregional ties already provide *(improves accounting)*; and
4. Evaluation of large load flexibility under the same resource adequacy framework applied to every other resource *(improves reliability)*.

a. Target investment to improve the winter performance of resources

Classification: *improves physical reliability.*
Potential Capacity: *6.3 GW*

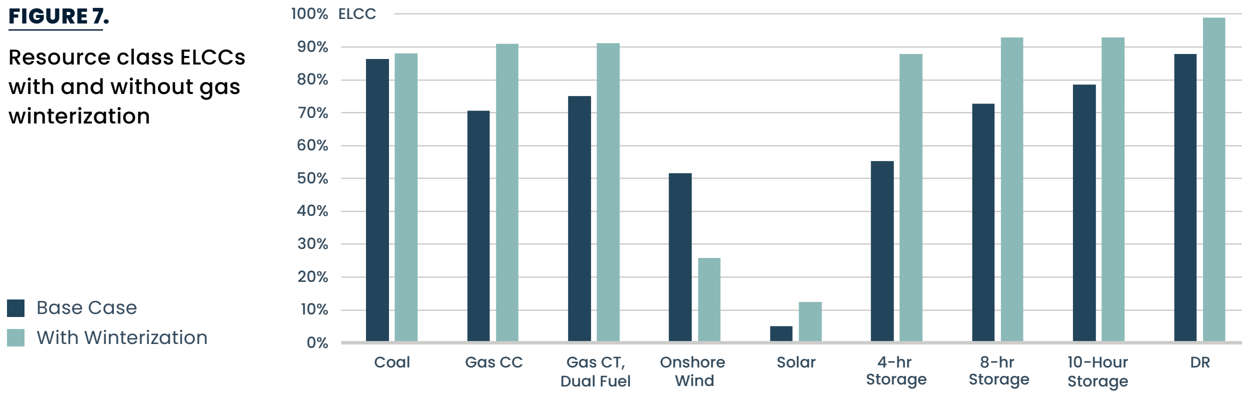
The most direct opportunity in front of PJM is not new capacity. It is making certain that the capacity already on the system is available when the system needs it most and to recognize those investments in accreditation methods.

PJM has roughly 82 GW of installed gas capacity but accredits only about 63.5 GW of it (76%). That gap between installed and accredited capacity reflects a real and well-documented pattern of underperformance during the extreme cold conditions that drive most of PJM's resource adequacy risk. The accreditation change did not create the problem; it revealed a risk that had been present all along but was not reflected in the market. While PJM has penalties for under-performance, these occur after an event, while accreditation shapes the investment case before one occurs.

We conducted probabilistic resource adequacy analysis using inputs consistent with PJM's ELCC model to estimate what a potential winterization improvement might be worth. Raising winter-storm availability of the gas fleet to 85 percent yields approximately 6.3 GW of firm capacity. Equally important, it shifts modeled resource adequacy risk back toward the summer season, which raises solar accreditation from roughly five percent to 13 percent and four-hour storage from roughly 55 percent to 88 percent (Figure 7). This improves the incentive for the resources that are most prevalent in the interconnection queue, and most likely to be available in the near-term given supply chain constraints for new gas turbines.

FIGURE 7.

Resource class ELCCs with and without gas winterization



The difficulty is that PJM's capacity market currently offers no way to recognize winterization. ELCC of gas resources is calculated by modeling weather dependent outages that occurred across thirteen years of historical performance. A generator that winterizes today, contracts for firm fuel, or installs dual-fuel capability will not see that investment reflected in the resource adequacy and ELCC models for years. And because extreme winter events are by definition rare, the historical record may take considerably longer than that to catch up because the first data point demonstrating improved performance cannot exist until the next severe winter storm arrives.

The consequence is a structural mismatch. Weather-dependent outages of the gas fleet are the primary source of resource adequacy risk in PJM and a principal driver of the overall capacity requirement. Yet the market provides essentially no incentive for the owners of those resources to reduce that risk. The signal instead points toward building new capacity, which is a slower, more expensive path.

Recommendation: There are two ways PJM's market design can incent this type of investment:

Recognize verified performance improvements prospectively. Accreditation can incorporate documented winterization measures and firm fuel arrangements at the time they are made, rather than waiting for a historical record to accumulate. Weighting recent years more heavily in the resource adequacy analysis would move in the same direction, allowing the models to respond to a changing fleet more quickly than a thirteen-year average permits. It should be noted that verification is critical: the standard should be demonstrated, auditable measures, rather than self-attestation.

Consider a backstop mechanism to fund winterization. PJM is currently developing a backstop auction to procure new capacity. A parallel, more near-term, and likely more cost-effective mechanism would fund performance improvements at existing resources. Winterization is inexpensive relative to new entry, can be completed on a timescale of months rather than years, and requires no interconnection process. PJM stakeholders would need to determine who pays for these upgrades and who benefits from the resulting accreditation changes.

For either measure, the essential design requirement is that the reliability benefit be reflected promptly in the resource adequacy framework. There are two channels available. PJM could model an assumed fleet-wide winterization improvement, lowering weather-dependent outage rates in the RA model and reducing the overall capacity requirement. The result would socialize the benefit across all loads. Alternatively, it could reflect verified improvements at the unit level, raising the accreditation of the resources that made them. The first is simpler to implement, but the second creates a direct investment incentive.

b. Recognize energy contributions from ERIS resources and deliverability caps in accreditation

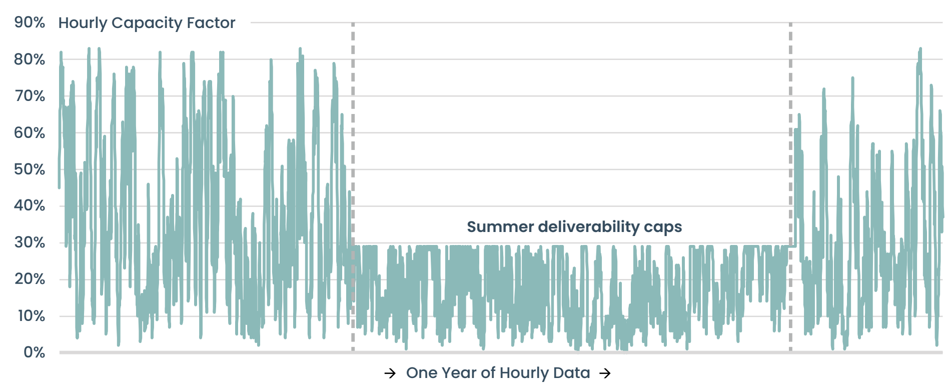
Classification: *accounting improvement.*
Potential Capacity: *2.4 GW*

PJM's resource adequacy models include only NRIS resources, and they apply caps in output to reflect capacity injection rights (CIRs) that hold modeled wind and solar output well below what those resources actually produce. The combined effect is a model that behaves as though every non-deliverable resource on the system is curtailed simultaneously, across the entire footprint, in every hour of the year (Figure 8).

FIGURE 8.

Hourly capacity factor for wind resources used in the resource adequacy ELCC model Figure

Source: Stenclik, et al., 2026[14]
Original Data Source: PJM



This assumption does not describe how the system operates, and the consequence extends beyond the resources being capped. The resource adequacy model is what sets the capacity auction parameters, including the IRM and the ELCC of every resource class. Removing energy from that model artificially tightens the system, not only during risk periods themselves but also in the hours immediately preceding and following them. While it remains uncertain whether any particular wind or solar resource will be available and deliverable during a given event, assuming that none of them are available simultaneously is an overly conservative design choice.

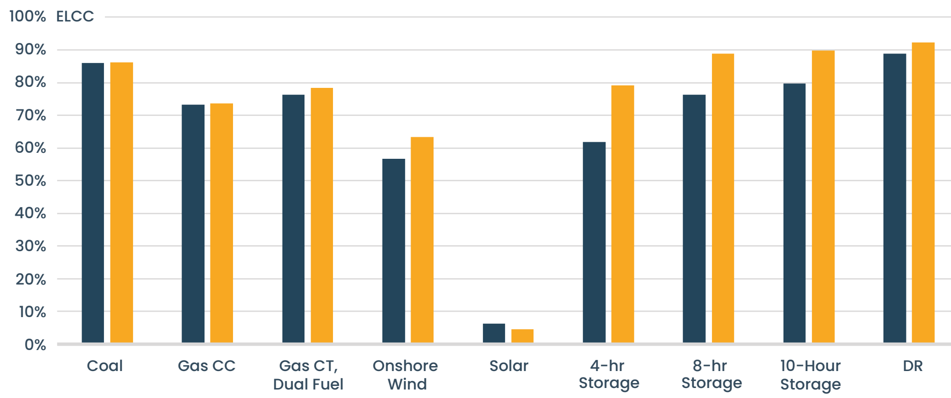
14 Stenclik, et al. 2026. *Understanding the Linkage between Transmission Deliverability and Resource Adequacy.* GridLab. https://gridlab.org/publications-rethinking-reliability/

We again conducted probabilistic resource adequacy analysis, first replicating PJM's treatment of CIR deliverability caps and then removing them, holding every other model input constant. That single change was worth approximately 2.4 GW of accredited capacity.[15]

FIGURE 9.

Resource class ELCCs with and without deliverability caps

Source: Stenclik, et al., 2026[16]



The mechanism is worth explaining, because the benefit is larger than a simple accounting of capped megawatts would suggest. Even when a capped resource would not itself be producing during a loss-of-load event, the energy it makes available beforehand can charge battery storage and pumped hydro, which then discharge during the event. Uncapped resources also shorten the duration of the resource adequacy risk period itself, which makes every energy-limited resource on the system more effective. The capping assumption therefore suppresses not only the output of the affected resources but the accredited value of the storage fleet that would otherwise use its energy.

Furthermore, deliverability caps are intended to represent transmission availability, but they are considerably more conservative than observed operations, where curtailment has been very low in recent years, especially during resource adequacy events. More significantly, during the winter storms that drive most of PJM's resource adequacy risk, the model implicitly assumes that gas resources retain their firm transmission rights even when those resources are on outage. The transmission capability reserved for a unit that is not running is not made available to a resource that is. The result is a model in which weather-dependent outages reduce accredited supply while leaving the associated transmission entitlements intact.

To clarify what is and is not being proposed: this paper does not suggest extending full capacity credit to ERIS resources. Those projects did not go through the NRIS process, and crediting them as though they had would be unfair to the projects that did (although it may make sense for ERIS resources to get some capacity credit). Instead, We recommend a targeted two-part modeling reform:

15 Stenclik, et al. 2026. *Understanding the Linkage between Transmission Deliverability and Resource Adequacy.* GridLab. https://gridlab.org/publications-rethinking-reliability/

16 ibid.

Align Reliability Modeling with Physical Reality: Remove artificial CIR deliverability caps and include energy only resources in the probabilistic resource adequacy models that set the planning reserve margin and other resource ELCCs. Capturing actual energy contributions correctly reflects system operations, such as pre-event battery charging and reduced risk event duration and improves total accredited capacity accuracy across all resource classes by roughly 2.4 GW.

Preserve Market Deliverability Standards: Keep financial capacity payments tied to acquired NRIS status and CIR holdings to minimize the changes to PJM market rules and interconnection processes.

Policy and capacity payments should reflect the level of service a resource purchased; system adequacy models, however, should reflect the physics of what the grid actually receives.

c. Non-firm interregional assistance

Classification: *accounting improvement.*
Potential Capacity: *2.5 GW (conservative assumption)*

PJM is among the largest and most interconnected balancing authorities in North America, with ties to NYISO, MISO, Duke, and TVA that have proven valuable during past resource adequacy events. But the capacity market recognizes only a fraction of that contribution.

PJM accounts for neighboring systems through probabilistic modeling paired with administrative limits on external assistance. The Reserve Requirement Study uses the PRISM model and a two-area loss-of-load probability framework dividing the system into the PJM RTO and an aggregated "Outside World" comprising NYISO, TVA, VACAR, and MISO excluding MISO South. That external region is modeled in aggregate rather than zonally, simulating emergency assistance under stressed conditions with forced outages, derates, and demand patterns drawn from historical data and weather years.[17]

Two parameters govern how much PJM may rely on this non-firm assistance. The Capacity Benefit Margin (CBM) is a hard ceiling on the emergency assistance the model may draw from neighbors, currently 3,500 MW. The Capacity Benefit of Ties (CBOT) is the assistance used to adjust the Installed Reserve Margin, and administratively set at 1.5 percent of PJM peak load, roughly 2,400 MW.[18] The tie benefit therefore reduces the total capacity PJM must procure to meet its one-day-in-ten-year criterion, and it is reviewed annually with stakeholders through the ELCC and RRS process.

17 PJM. 2023. *2023 PJM Reserve Requirement Study.* https://www.pjm.com/-/media/DotCom/planning/res-adeq/2023-pjm-reserve-requirement-study.ashx

18 Ibid.

The structure has two limitations, one conceptual and one technical. The conceptual limitation is the ceiling itself. Every resource class carries some risk of non-performance, which is precisely why PJM accredits each of them on the basis of simulated and historical performance and probabilistic resource adequacy modeling. Interregional ties are subject to the same logic and deserve similar treatment. The reasonable objection to relying on neighbors is that they may be stressed simultaneously, and that objection is sound. But the answer to correlated risk is to model the correlation, not to impose an administrative cap. The quantity PJM assumes available should be the output of probabilistic analysis of its neighbors' systems, informed by observed performance during past events. This is the same standard applied to every internal capacity resource.

The technical limitation follows from the two-area structure. Aggregating all external regions into a single "Outside World" makes it difficult to represent the geographic diversity that gives interregional assistance much of its value. PJM's neighbors are not identically situated: a winter storm that stresses the Mid-Atlantic does not affect MISO's western footprint the way it affects VACAR, and the correlation between PJM and each neighbor differs meaningfully by event type and season. A multi-area representation would capture that diversity or correlations.

We believe a conservative estimate of this nonfirm external assistance would be worth another 2,500 MW and would bring PJM in line with other regions, including MISO, ISONE, and NYISO, all of which count on a higher share of nonfirm external assistance when measured as a percentage of peak demand.

The process also ignores future interregional ties. Proposed interties, like the ones to IESO and SPP, would extend PJM's reach into systems with different weather and load patterns, but the capacity market has no mechanism to reflect the reliability value of new interregional transmission. A transmission project that measurably reduces loss-of-load expectation produces no corresponding change in the capacity requirement.

This argument should not be confused with the existing firm-import pathway. External resources can and do participate in RPM today, provided they hold confirmed firm transmission service across the complete path into PJM and satisfy pseudo-tie requirements. This paper is not proposing changes to it. The subject of this section is different: the non-firm, uncommitted assistance that PJM's neighbors have provided during emergencies without any contractual obligation to do so.

Recommendation: PJM and stakeholders can consider replacing the administrative ceiling with a probabilistically determined value, aligned with processes in MISO, NYISO, and ISONE. To do this, PJM can model external regions with sufficient granularity to represent both diversity and correlation, validate against historical performance during prior events, and allow the resulting tie benefit to reflect what the analysis supports. Where new interregional transmission demonstrably improves resource adequacy, that improvement can be accounted for as either a reduction in the system-wide capacity requirement or directly accredited as a supply side resource.

d. Accredit large load and data center flexibility

Classification: *improves physical reliability.*
Potential Capacity: *to be determined*

This lever is receiving substantially more attention than the others, so we treat it briefly. Even modest flexibility from the loads driving the capacity crunch eliminates a meaningful share of the shortfall, without the need for new capacity additions. This flexibility can come from compute curtailment, temporal and geographic workload shifting, on-site generation and storage, including through PJM's proposed 'bring your own new capacity' (BYONC) construct, and potentially partnership with distributed energy resource aggregators.

However, PJM's proposed Interim Resource Adequacy Service framework illustrates the all-or-nothing structure: a large load either brings its own new capacity equal to its load obligation, or is subject to uncapped curtailment.[19] This uncapped risk of load curtailments is untenable to most large loads whose business model depends on availability commitments to their own customers. Presented as an all or nothing decision, the answer for flexibility is almost always "no."

But the choice does not need to be binary, nor mutually exclusive. The same probabilistic resource adequacy methods PJM uses to set the planning reserve margin and to accredit generation can be applied directly to load flexibility. Two analyses would be particularly useful.

Recommendation: Two analyses would be particularly useful:

First, PJM could calculate the expected number of hours of large load curtailment required to maintain the one-day-in-ten-year criterion. This establishes an expected magnitude of the obligation, which we expect would prove considerably smaller than the framing of the current debate implies.

Second, PJM could calculate the effective load carrying capability of a range of flexibility commitments. For example, options could include up to 100 hours per year with a maximum duration of 12 hours, compared against up to 50 hours per year with a maximum duration of four hours. Each configuration would carry a corresponding accredited ELCC value (Figure 10).[20]

19 *Proposal of PJM Interconnection, L.L.C. to Establish Interim Resource Adequacy Service and a Large Load Registry to Address System Reliability,* Docket No. ER26-3515-000 (FERC filed Aug. 13, 2026), https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20260813-5118.

20 Cox, et al. 2026. *Bringing Data Center Flexibility into Resource Adequacy Planning.* GridLab. https://gridlab.org/datacenter_flex/

FIGURE 10. Example ELCC matrix of data center flexibility by availability and response size. *Source: GridLab*

		Max Response	
		1GW	**2GW**
Availability (% Uptime Required by Data Centers)	**99.5%**	87%	77%
	99.7%	86%	66%
	99.9%	67%	46%

The informational value alone would be substantial. But the more important consequence is that it converts a binary ultimatum into a menu of options. A large load could select the flexibility commitment matching its operational tolerance, receive accreditation for it, and procure capacity to cover the remainder. A hyperscaler unwilling to accept unlimited curtailment might readily accept fifty hours annually in four-hour blocks, but under the current framing, that offer is never made. Treating flexibility as a continuum rather than a binary choice also applies the same analytical standard to load that PJM already applies to every generator: contributions are measured and partial contributions are credited proportionally.

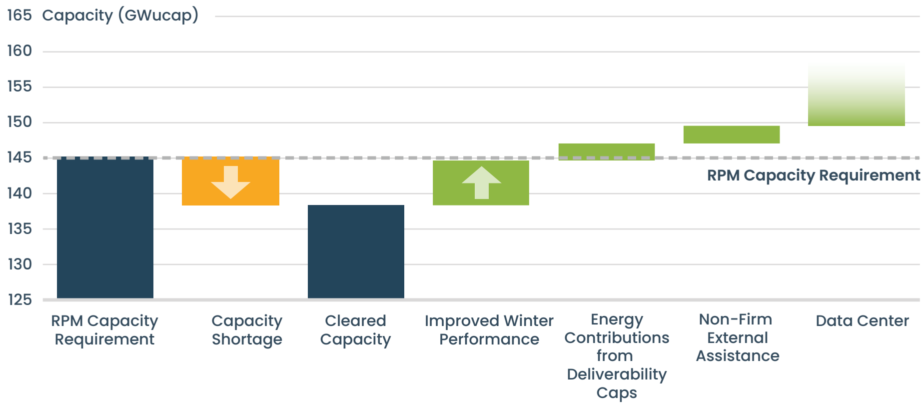
Conclusion and Prioritization

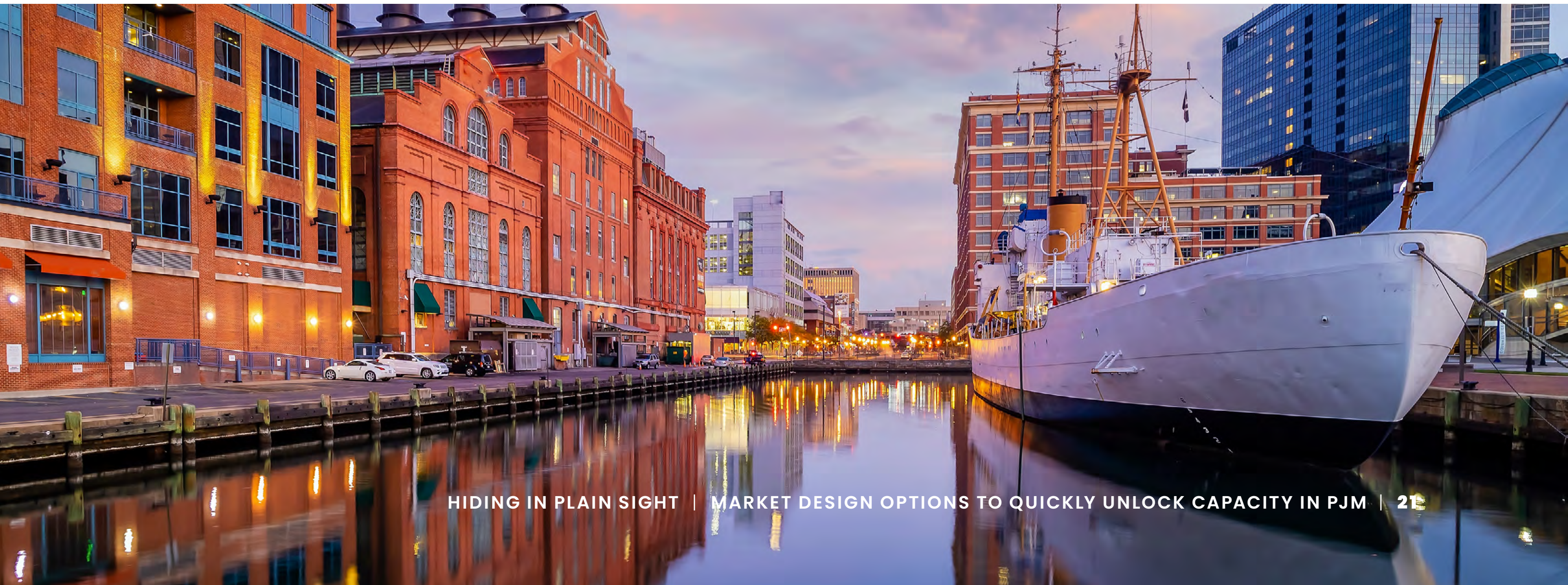
More than 11 GW of near-term capacity is available with little or no new infrastructure.

Taken together, these four measures represent over 11 GW of near-term capacity, with little or no new infrastructure required and would close the capacity shortage seen in the most recent auction (Figure 11). Two of them improve the physical performance of the system, while two improve accounting methods that understate existing assets. Because all four can work in PJM's existing market framework, these solutions can move forward faster than traditional new capacity can come online.

FIGURE 11.

PJM Capacity shortage and cumulative impact of potential mitigations





The recommendations in this paper follow a deliberate sequence. First, interconnect resources faster, treating energy-only service as a genuine provisional pathway. Second, unlock the capacity already on the system, including more than 11 GW available through improved winter performance, corrected accounting for energy contributions and interregional ties, and a workable framework for large load flexibility. Each of these can be accomplished on a stakeholder-process timescale, and each buys time for the more substantial market reforms that will take longer to design and implement.

Importantly, the measures proposed here operate inside the existing capacity market and can be adjusted if they prove wrong. Structural change, whether to the capacity construct itself or to PJM's governance, is slower, harder to reverse, and carries larger consequences. The reversible reforms proposed in this paper should be tried first, allowing stakeholders time to appropriately consider larger governance questions or new market design.

This does not mean avoiding the harder questions. PJM and its stakeholders should continue serious evaluation of an energy-based construct paired with explicit reliability mechanisms, and the near-term measures recommended here are consistent with that direction. Faster interconnection, winterization, and flexibility commitments from large loads all become more valuable, not less, under a market that relies more heavily on energy and scarcity pricing. The reforms described here are offered in that spirit: near-term, actionable, and consistent with a longer transition that PJM and its states should undertake deliberately rather than under duress.

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